

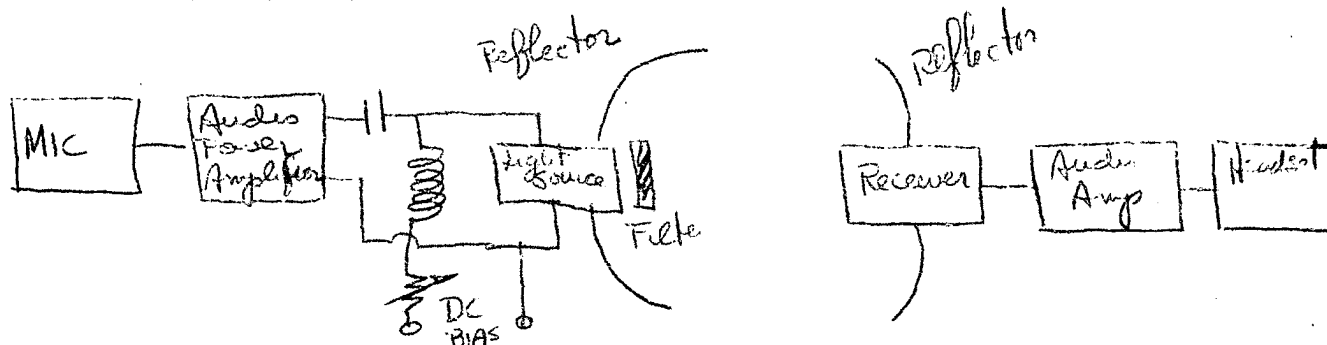
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LIGHT MODULATION

Modulation of light can be accomplished electrically as illustrated:



The portion of the electromagnetic spectrum used for transmitting depends on the source as well as the characteristics of the filter. The choice of the type of detector depends upon the portion of the spectrum transmitted, i.e. a lead sulfide cell would be used for the near infrared.

The range of a communication system illustrated above depends on:

- a. Source brightness
- b. Size of reflectors (beamwidth)
- c. Sensitivity of receiver cell
- d. Atmospheric attenuation
- e. Modulation percentage obtainable

The light source can either be a tungsten filament or a gas discharge lamp.

a. Tungsten - The advantage of this source is that it is small and uncomplicated. Like the modulated arc lamps, they have no moving parts, and the lamps are commercially available. The disadvantage is that the modulation ratio depends on the heating and cooling time of the filaments. For voice modulation, they must therefore be made of very fine wire; but even when they are so fine as to be fragile, the ratio of modulated light to total light is not very large at the speech frequencies over 1000 cycles per second which are important for intelligibility. Obtainable ranges with such voice systems are therefore small. Another disadvantage for voice use is that the light output is a very nonlinear function of either current or voltage. These features are drawbacks only with voice modulation; for code operation, at low frequencies, modulated tungsten lamps are good sources and give good communication ranges.

b. Presently available gas discharge lamps are easy to modulate but present other problems. The power supply must be ballasted to prevent runaway, starting the arc is sometimes difficult, the image does not always form in the same place, etc. If size is of no importance, equipment of this nature is a definite possibility.

Communication Systems using:

c. Flashlight bulbs electrically modulated have been built. With 4"-5" optics ranges of about 1/4 mile can be obtained in good weather. Voice quality is fair.

d. Mechanical modulation of light is usually used for a tungsten filament source. Such systems are optically critical and require careful construction. Good performance can be obtained this way.



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